21. A method of producing fire scale resistant, work ~~hardable~~ hardenable jewelry silver alloy compositions according to claim 1, further including the step of alloying silver metal with a master alloy comprising copper, zinc, silicon, and germanium.

22. A method of producing fire scale resistant, work ~~hardable~~ hardenable jewelry silver alloy compositions according to claim 7, further including the step of alloying silver metal with a master alloy comprising copper, zinc, silicon, boron, indium and germanium.

23. A method of producing fire scale resistant, work ~~hardable~~ hardenable jewelry silver alloy compositions according to claim 9, further including the step of alloying silver metal with a master alloy comprising copper, zinc, silicon, boron, indium, germanium and tin.

REMARKS

Claims 1-20 are pending in the application. Claims 5 and 16 are withdrawn from consideration, and claims 21 - 23 have been added. The required fee of $66 has been included to cover the cost of the three additional dependent claims, in excess of the 20 claims of the present application. Accordingly, claims 1-4, 6-10, 13-15, and 17 - 20 are at issue.

The specification has been amended to correct the informalities identified by the Examiner. Specifically, the spelling of "jewellery" has been corrected to --jewelry-- throughout the specification. Also, the "Abstract Of The Disclosure" has been added, as required by statute.

Reconsideration of the rejection of claims 1-10 and 13-20 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention, is respectfully requested.

Independent claims 1 and 20 have been amended to include a percentage of silver in the claimed compositions.

Claims 1-4, 6-10, and 13-14 have been amended to correct the spelling of "jewellery" to --jewelry--, and claim 15 has been amended to correct the spelling of "Jewellerysilver" to --jewelry silver--.

Claims 17-20 have been amended to included a --.--, and claim 20 has also been amended to include a complete list of elements in the claimed silver composition.

Claims 7-8 have been amended to include conventional markush language as suggested by the Examiner, and claims 5 and 16 has been withdrawn from consideration. In view of the above amendments, claims 1-4, 6-10, 13-15, and 17-20 are now believed allowable.

Reconsideration of the rejection of claims 1, 4, and 6-9 under 35 U.S.C. § 102(b) as being anticipated over JP61-34,148 is respectfully requested. Independent claim 1 has been amended to more clearly recite the presence of silicon in the claimed silver alloy composition. Japanese patent JP61-34,148, and specifically example four as identified by the Examiner, does not teach of using silicon in combination with germanium in a silver alloy composition. In view of the above amendment to claim 1, and the failure of JP61-34,148 to teach every aspect of applicant's claimed invention, claim 1, and dependent claims 4, & 6-9 which ultimately depend from claim 1, are now believed allowable.

Claims 1-4, and 6-10 stand rejection under 35 U.S.C. § 103(a) as unpatentable over JP52-23,660. Claims 1-10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Harigaya et al Patent No. 3,811,876. Further, claims 1-20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Bernhard et al Patent No. 5,039,479, in view of

Youdelis Patent No. 4,124,380, and JP04-224,645. Applicant respectfully traverses these rejections as based on a mischaracterization of Youdelis, and JP04-224,645 and a clear misunderstanding of the claims by the Examiner.

Independent claim 1 defines a fire scale resistant, work hardenable silver alloy composition as including 84.5-99.42% silver, 0.5-6% copper, 0.5-7% of a mixture of zinc and silicon including 0.02-2% silicon, and 0.01-2.5% germanium. This silver alloy composition is particularly useful for jewelry making due to its increased fire scale resistance, reduced porosity and grain size, and improved work hardening performance over current fire scale resistant alloys.

The zinc component of the silver alloy composition of claim 1 functions as a deoxidizing agent for the silver copper oxides, preventing copper oxide inclusions from forming in the melt during casting. The silicon component is included in an amount relative to the proportion of zinc in the claimed composition , and along with the zinc component, reacts with available oxygen, as a sacrificial metal, preventing dense copper oxide from forming in the melt. This zinc, silicon combination increases the fire scale resistance of the silver alloy of claim 1, while maintaining a suitable silver color which is preferable in jewelry making. There is also no suggestion in Youdelis of using zinc or silicon, to provide for a silver alloy composition with increased fire scale resistance, along with a suitable color for jewelry making.

Germanium is added to the silver alloy composition of claim 1, and provides increased work hardening ability equal to that of conventional sterling silver, but with the added benefit of superior fire scale resistance. The germanium component of the silver alloy of claim 1 further provides superior work hardening ability over other fire scale resistant alloys. In Bernhard, which was disclosed by applicant to the Examiner,

there is no suggestion of using germanium in a silver alloy composition, to provide for superior work hardenability over other fire resistant silver alloys. Additionally, there is no teaching in JP04-224,645 of a silver copper alloy. JP04-224,645 does not address the unique problems associated with silver copper alloys, namely fire scale resistance, and increased work hardenability.

Applicant respectfully submits that the Examiner has erroneously equated the occurrence of fire scale in silver with the tarnishing of silver. Tarnishing of silver metal occurs when the surface is exposed to the atmosphere, and specifically to sulfur compounds such as oxide or hydrogen sulfide. As a result of the exposure to such sulphur compounds and oxides, the surface of the silver metal is discolored. Such discoloration can be removed however, with a light polishing. Additionally, copper containing metal alloys may also exhibit surface tarnishing, due to the oxidation of copper at a surface.

Fire scale or fire stain on the other hand, is a particular problem associated with silver copper alloys, such as with sterling silver used for jewelry making. When the silver copper alloys are cast or heated to annealing temperatures, and welded, soldered or otherwise heated, oxygen permeates into the silver copper metal. The permeating of oxygen into the silver copper metal results in the formation of a black or red colored blemish known as fire scale. This fire scale blemish can penetrate the silver copper metal, unlike tarnishing of silver which is a superficial blemish. Lightly polishing the surface of the silver copper alloy will produce a lustrous finish appearing to be pure silver, however heavier and continuous polishing will wear through the thin surface of the silver copper alloy to reveal the deep discoloration below, known as fire scale.

Neither Youdelis, nor JP04-224,645, addresses the problem of reducing fire scale

blemishing in silver copper alloys, used for decorative purposes, namely jewelry making. Youdelis teaches only of reducing the occurrence of tarnishing in silver copper alloys used in an oral environment, namely dentistry. JP04-224,645 does not teach of silver copper alloys at all, but rather teaches of copper alloys. There is no motivation in either of these two references for combining them with Bernhard. Further, neither of these two references address the specific problems associated with silver copper alloys used for jewelry making, namely reduced fire scale blemishing, while at the same time increasing work hardenability. In view of the above arguments, claim 1 is believed allowable.

Amended claims 2-4, and claim 6, depend form claim 1 and are believed allowable for the same reasons thereof.

Amended claim 7 depends from claim 1 and replaces up to 3.5% weight of the silver content with indium, boron, or a mixture of indium and boron. Amended claim 8 depends from claim 7 and further specifies that said portion of up to 3.5% silver content, is replaced by a mixture comprising up to 2.0% by weight boron and up to 1.5% by weight indium. The indium boron additives aid in improving the castability and wetting performance of the silver copper molten alloy of the claimed invention. The mixture of indium and boron provide grain refinement and reduced surface tension, thereby providing greater wetability of the silver copper molten alloy. There is no suggestion in Youdelis of including boron or indium in a silver alloy composition. In view of the above arguments, claims 7 and 8 are believed allowable.

Amended claim 9 depends from claim 1, amended claim 10 depends from claim 9, and both are believed allowable for the same reasons as stated above for independent claim 1.

Independent claims 11 and 12, and 17 - 20 specify a further embodiment of the claimed invention, and are believed allowable for the same reasons as stated above for claim 1.

Claim 13 depends from claim 1 and provides for a method of producing fire scale resistant work hardenable jewelry silver alloys, according to the composition of claim 1. Claim 14 depends from claim 7 and provides for a method of producing fire scale resistant work hardenable jewelry silver alloys, according to the composition of claim 7. Further, claim 15 depends from claim 9 and provides for a method of producing fire scale resistant work hardenable jewelry silver alloys, according to the composition of claim 9.

Claim 13-15 ultimately depend from claim 1, and are believed allowable for the same reasons as stated above for claim 1.

Applicant asserts that in view of the foregoing amendments and arguments, that all of the Examiner's objections have been obviated. Applicant, therefore, respectfully requests withdrawal of the objections and allowance of the application.

Enclosed herewith is a check for $66.00 in payment of the fee for the additional three claims beyond twenty.

The Commissioner is hereby authorized to charge any underage or to credit any overage regarding this matter to our Deposit Account No. 04-2219.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on July 28, 1997.

Leah L. Grinnage

SMK/llg